

**PROTOSIALIS RANCHOGRANDIS, A NEW SPECIES OF ALDERFLY FROM VENEZUELA, WITH A REDESCRIPTION OF *P. BRASILIENSIS* NAVÁS (MEGALOPTERA: SIALIDAE)**

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*Abstract.*—The Neotropical fauna of Sialidae (Megaloptera) contains nine previously described species. In this paper, *Protosialis ranchograndis*, a new species from Aragua, northern Venezuela, is described and illustrated. Male genitalia of the new species are distinct, in particular because of a divided tenth sternite which appears as a double plate in caudal view. Also, *P. brasiliensis* Navás, 1936, is redescribed and illustrated based on the deteriorated holotype. Terminology and homologies of male genitalia in Sialidae, as well as the taxonomic status of the genus *Protosialis* Weele, are briefly discussed.

*Resumen.*—La fauna neotropical de Sialidae (Megaloptera) contiene nueve especies previamente descritas. En este artículo se describe e ilustra a *Protosialis ranchograndis*, una especie nueva de Aragua, norte de Venezuela. La morfología genital del macho es distintiva, en particular por su décimo esternito dividido, el cual se observa como una doble placa en vista caudal. También, se redescrive e ilustra el deteriorado holotipo de *P. brasiliensis* Navás. La terminología y las homologías de genitalia en machos de Sialidae, así como el estatus taxonómico del género *Protosialis* Weele, son discutidos brevemente.

*Key Words:* Neuropterida, Neotropics, Aragua, Rancho Grande, Brazil, taxonomy

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Neotropical alderflies (Megaloptera: Sialidae) have been a largely neglected group at least for two reasons, their rarity, which includes both a low species diversity and a scarcity of specimens in collections, and difficulties associated with studying type material. During a visit in 1999 to the Museo del Instituto de Zoología Agrícola “Francisco Fernández Yépez” (MIZA) of the Universidad Central de Venezuela, Maracay, several undescribed species of Megaloptera were found (Contreras-Ramos 2002), including the one treated here.

Gradually, as more sialid material from the Neotropics becomes available for study, the diversity of this group in the Neotropics will become better understood. For example, of the nine described species of Neotropical Sialidae (Contreras-Ramos 1999, Contreras-Ramos et al. 2005), specimens of *Protosialis bifasciata* (Hagen), *P. brasiliensis* Navás, *P. chilensis* (MacLachlan), *P. flammata* Penny, *P. hauseri* Contreras, Fiorentin, and Urakami, and *P. mexicana* (Banks) are clearly distinct and represent valid species. However, the original descrip-

tion of *P. flavicollis* (Enderlein) from Colombia lists some characters (Enderlein 1910) that do not correspond with the specimens I studied (e.g., body and antennae black, yellowish pronotum, and modified tarsal claws). *Protosialis bimaculata* Banks, from Bolivia, is similar to *P. mexicana*, black with yellowish head and prothorax (Banks 1920), and *P. nubila* Navás, from Brazil, is also similar to *P. mexicana*, being “*nigra*” (Navás 1933), including antennae. As the color pattern of the Venezuelan species is rather uniformly reddish brown, and because of an observed limited distributional range in most Neotropical alderflies, there is sufficient confidence to warrant describing a new species.

The holotype of *Protosialis brasiliensis* is in a deteriorated condition, and the original description was not thorough. Because of these constraints, I redescribe this species in this paper.

Specimen dissection followed standard techniques (e.g., Contreras-Ramos 1998). Venational terminology follows Glorioso (1981). However, for the genitalic terminology of Sialidae, different authors such as Ross (1937) and Whiting (1994) each have used different names for the same structures, which are also different from the ones used for Corydalinae. Here (Table 1), a unified terminology based on Glorioso (1981) and Contreras-Ramos (1998; cf. table 2, p. 21) is attempted assuming that Corydalinae represents the generalized condition within Megaloptera (Contreras-Ramos 2004). All type material of the new species is deposited at MIZA, while the holotype of *Protosialis brasiliensis* belongs to the Museu de Zoologia da Universidade de São Paulo (MZSP), Ipiranga, Brazil.

#### Genus *Protosialis* Weele 1909

The taxonomic validity of this genus is uncertain. Weele (1909, 1910) proposed the genus to include *Sialis americana* (Rambur), the type species, as well as

*Protosialis mexicana*, *P. bifasciata*, and *P. chilensis*, based on several color, shape, and venational characters (Table 2), a view that was supported by Penny (1981). Whiting (1994) questioned most of these characters, and he further proposed a couple of male genitalic structures which might help delimit *Protosialis*. However, a final decision on whether this is a valid genus or a junior synonym of *Sialis* must await a genus level revision of the Sialidae.

#### *Protosialis ranchograndis* Contreras-Ramos, new species

(Figs. 1, 2, 6, 7, 9, 11–15)

Diagnosis.—This species (Fig. 6) may be distinguished from all other Neotropical alderflies by its uniform orange-brown head (Figs. 1, 7). The pronotum is also uniformly colored but with a darker tone. The coloration of this species contrasts with species such as *Protosialis bifasciata*, *P. mexicana*, and *P. flammata*, all of which clearly have a patterned head. The male genitalia are distinct with the tenth sternite modified as a sclerotized double plate that is generally fusiform shaped in caudal view (Fig. 11). The tenth tergites are short and widely separated. An eversible sac is evident between the ninth and tenth sternites, which is pinnaculate, that is, it has a conspicuous concentration of thorny setae (Figs. 11–12). Larvae of this species have been collected but remain undescribed.

Description of adult.—Forewing length, ♂ 8.4–10.4 mm (average 9.6 mm,  $n = 4$ ), ♀ 12.0–13.4 mm (average 12.7 mm,  $n = 2$ ). Overall color pale orange brown, wings slightly darker. Head orange brown, including labrum and clypeus, pilose; antenna brown, scape slightly paler, pilose, 35-segmented; head ventrally pale yellowish brown, mandibles reduced, and concealed beneath labrum, maxillary and labial palps

Table 1. A proposed unified terminology for male genitalia of Megaloptera with emphasis on Sialidae (based on several authors and synthesized in Contreras-Ramos 1998, Table 2).

Ross (1937)	Whiting (1994)	Proposed Terminology
Lateral plates	Parameres	Ninth gonostyli <sup>1</sup>
Terminal plate	Ectoprocts	Tenth tergites <sup>2</sup>
Genital plate, with genital hooks	Gonarcus, with mediunci (mediuncus in singular)	Tenth sternite, with tenth sternite lobes <sup>3</sup>

<sup>1</sup> Appendages variously reduced in Sialidae, often appearing as plates.

<sup>2</sup> Appendages variously reduced in Sialidae, some times also fused as a single structure.

<sup>3</sup> This sclerotized plate may have more or less complex processes arising from it, which may be evolutionary novelties or perhaps correspond to the membranous lobes in Corydalinae.

brown, and 4- and 3-segmented, respectively.

Pronotum orange brown with margins darker, covered with fine and short golden setae. Legs rather uniformly pale

brown; 5-segmented tarsi darker brown, tarsal claws brown with basal tooth conical, blunt. Forewing (Figs. 2, 9) dull reddish brown, semitranslucent, and elongate-elliptical, costal area not en-

Table 2. A non-critical comparison between the genera *Sialis* Latreille and *Protosialis* Weele as has been proposed by several authors (modified from Weele 1910, Penny 1981, and Whiting 1994).

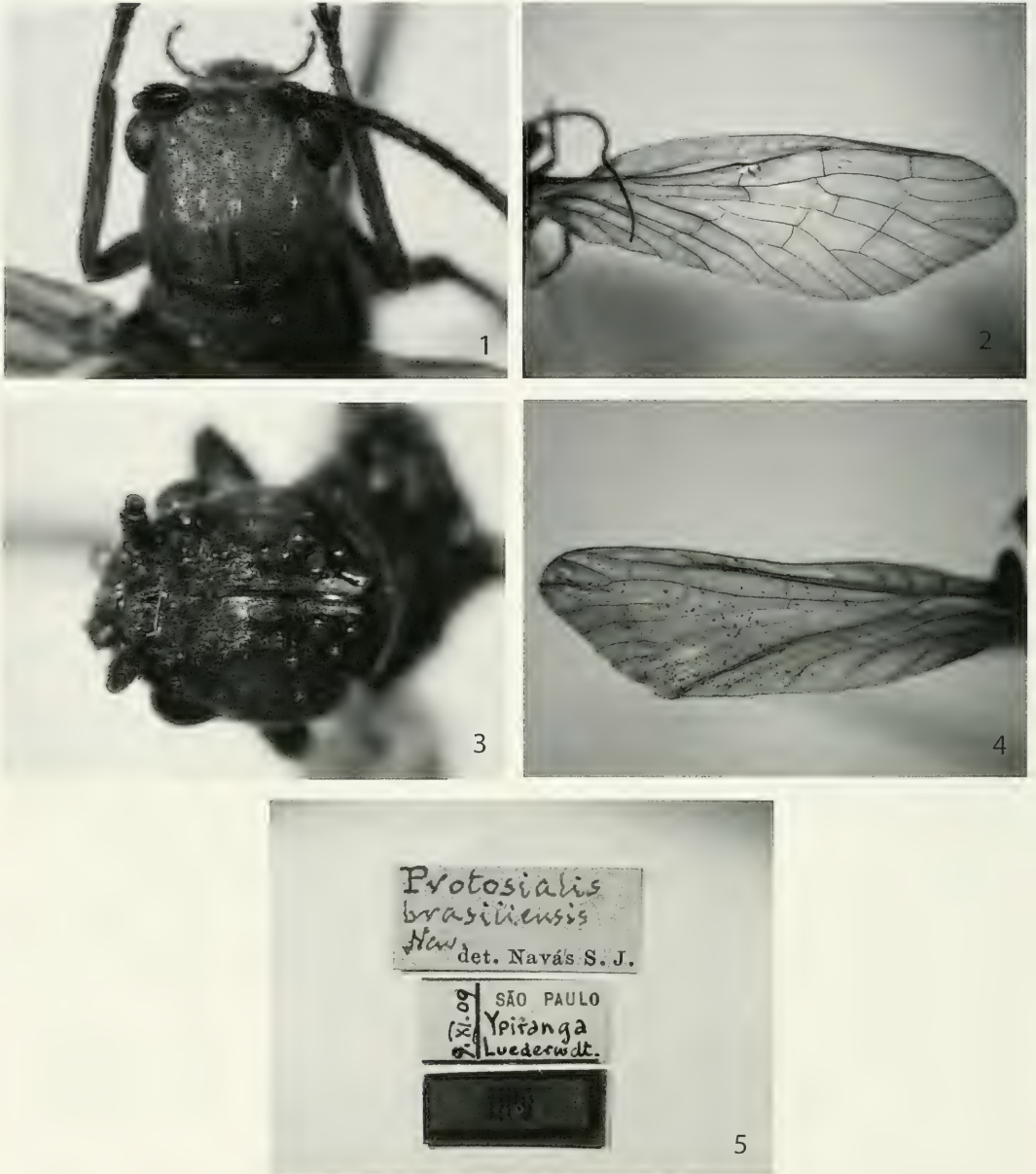
Attribute	<i>Sialis</i>	<i>Protosialis</i>
Distribution	Holarctic	Neotropical
Diversity	24 described spp.	9 described spp.
Overall shape	Body stout, wings broad and short	Body and wings rather slender
Overall color	Body black, only some yellow streaks on occiput	Body black with orange <sup>1</sup>
Antennae	Simple, moniliform in both sexes	Thickly pilose in male, hairless in female
Wings	Pale brown membrane, thick (elevated and very distinct) nervature	Dark membrane, thin (not so distinct) nervature
Wing venation	Costal area dilated before middle; costal crossveins vertical; Sc and R strongly divergent in middle; 2nd branch of Rs (R <sub>3</sub> ) forked in both wings	Costal area not enlarged before middle; costal crossveins oblique; Sc and R nearly parallel; 2nd branch of Rs (R <sub>3</sub> ) simple in both wings <sup>2</sup>
Male genitalia, general condition	Rather specialized (e.g., more reductions, fusions, and complex shapes)	More primitive (e.g., not as reduced, neither fused, and with simpler shapes)
Male genitalia, eversible sac between 9th and 10th sternites	Absent <sup>3</sup>	Present
Male genitalia, membranous region between 9th and 10th sternites	Simple, smooth <sup>4</sup>	Pinnaculate (with thorny setae)

<sup>1</sup> Orange color mostly on head and pronotum.

<sup>2</sup> Except in *P. brasiliensis*, *P. flammata*, *P. nubila*, and *P. ranchograndis*.

<sup>3</sup> Present in *S. nevadensis* Davis.

<sup>4</sup> Except in *S. nevadensis*, in which it is pinnaculate.

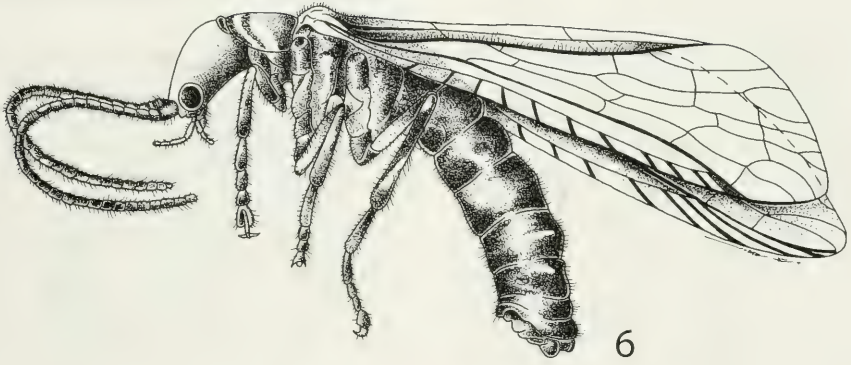


Figs. 1-5. *Protosialis* spp. 1, *P. ranchograndis*, head and pronotum. 2, Same, left forewing. 3, *P. brasiliensis*, head and pronotum. 4, Same, left forewing. 5, Same, specimen labels.

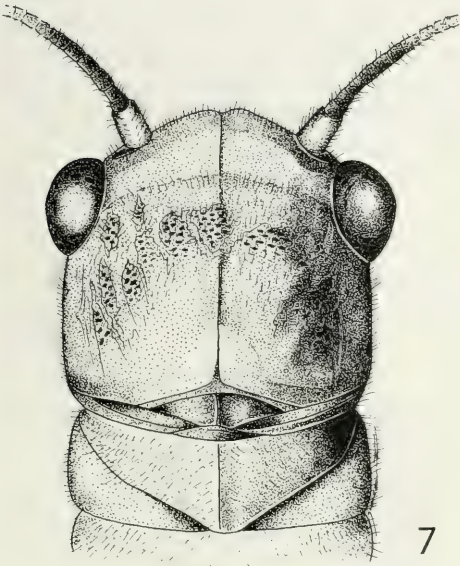
larged, with 9-11 crossveins, those distally more oblique and less well-defined; three crossveins between  $R_1$  and  $R_s$ , the latter with two branches, both forked; four r-m crossveins.

*Male genitalia* (Figs. 11-13): Ninth tergum short, well-sclerotized (Fig. 12);

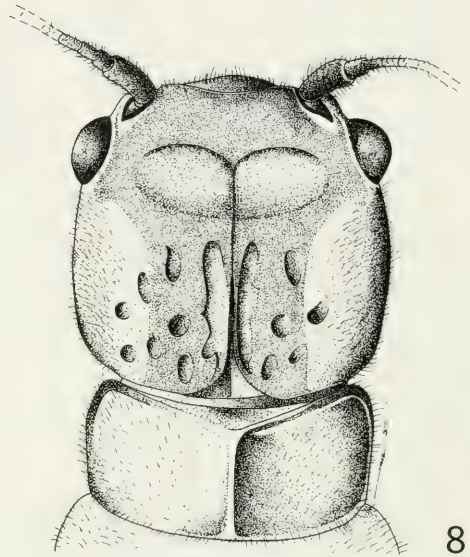
tenth tergites conspicuous, lobe-shaped, separated (Figs. 11, 13); tenth sternite as an ovoid double plate in caudal view, upper and lower halves of the plate terminally square-shaped (Fig. 11), upper half of plate shaped as a bird head in lateral view (Fig. 12); eversible mem-



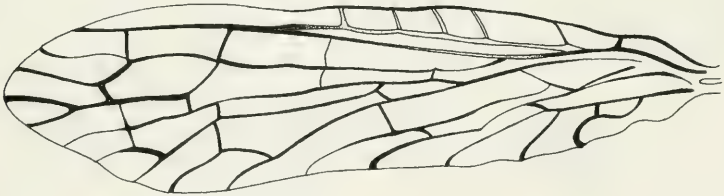
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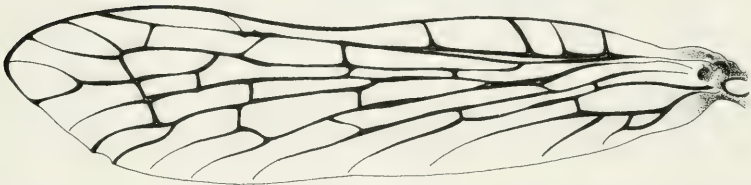
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10

Figs. 6-10. *Protosialis* spp. 6, *P. ranchograndis*, habitus. 7, Same, head and pronotum. 8, *P. brasiliensis*, head and pronotum. 9, *P. ranchograndis*, left forewing. 10, *P. brasiliensis*, left forewing.

brane between tenth and ninth sternites conspicuous, bearing an area of densely concentrated sclerotized setae (Fig. 11); ninth gonostyli lobe-shaped, setose; ninth sternum elongate-ovoid.

*Female genitalia* (Figs. 14–15): Seventh abdominal sternum moderately sclerotized, especially on a median bump, distally (Fig. 14); eighth sternum distinctive, with a sclerotized and broadly bilobed plate (Fig. 14), which is obscured by the base of the ovipositor and remainder of ninth segment (Fig. 15).

*Material examined*.—Holotype ♂: VENEZUELA. Aragua: Rancho Grande, 1,100 m, 31.v.1994, M. Gaiani [at light, in alcohol, genitalia in glycerin] (MIZA).

*Paratypes*.—VENEZUELA. [No collecting data, probably from Rancho Grande], 1 ♂; Aragua: Rancho Grande, 1,100 m, 25.xi.[19]49, F. Fernández Y., 1 ♂; same but 4.v.1977, L. J. Joly T., 1 ♀; same but 24.v.1984, F. Fernández Y., J. Clavijo, 1 ♂, luz de mercurio; same but 19.v.[19]89, M. Gaiani, J. Manzanilla, 1 ♀ (MIZA).

*Etymology*.—The name of the new species refers to the classic locality Rancho Grande (Estación Biológica de Rancho Grande), close to Maracay, within Parque Nacional Henri Pittier, on the Coast Cordillera, an area intensively studied by the entomological staff of MIZA.

*Protosialis brasiliensis* Navás 1936  
(Figs. 3–5, 8, 10)

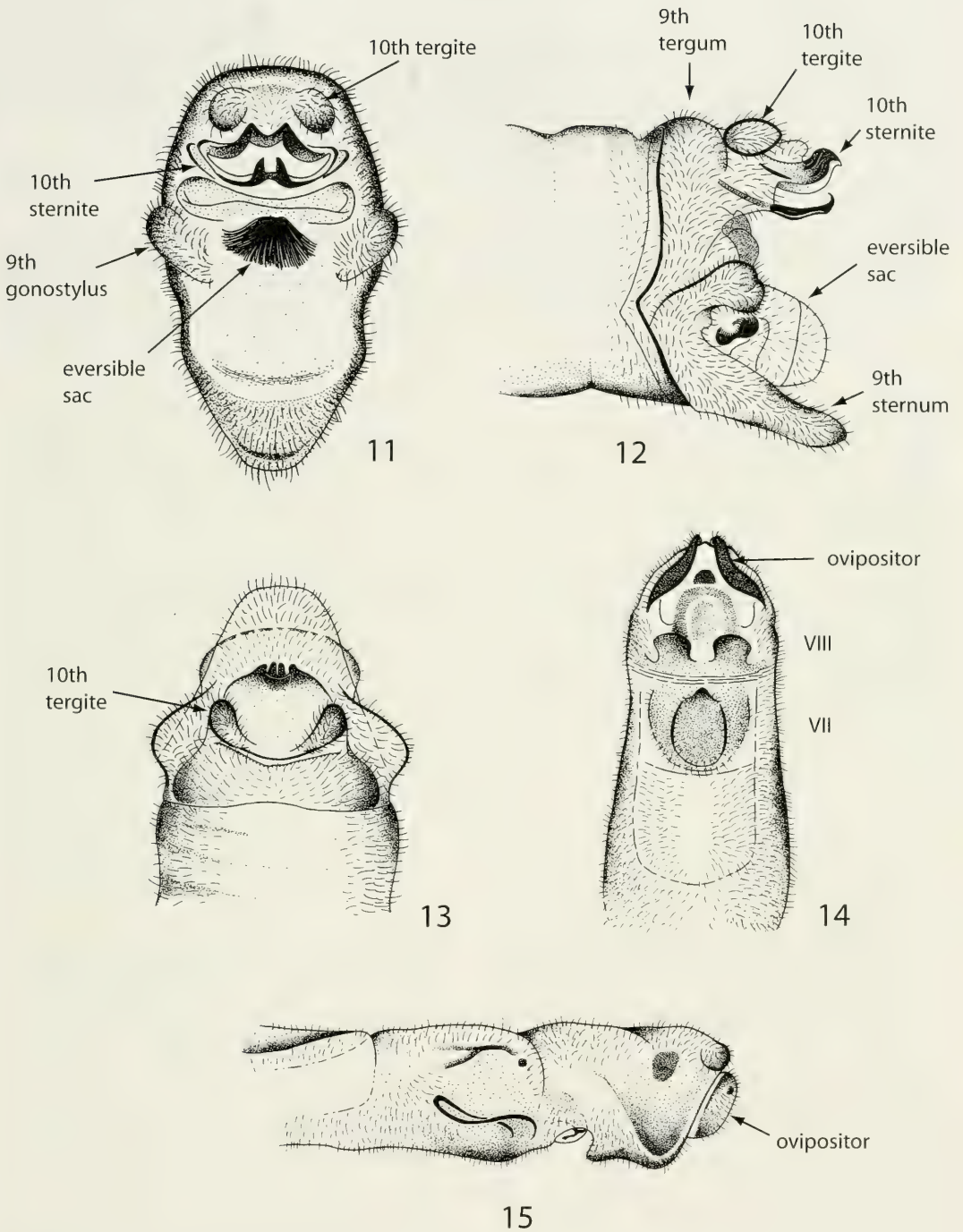
*Diagnosis*.—Because of the deteriorated condition of the holotype this species can not be diagnosed on the basis of genitalia. The specimen is missing antennae, abdomen, both right wings and the left hindwing, as well as the left midleg, tarsi of the right midleg, and both hindlegs. However, the remainder of the specimen can be differentiated by its color pattern. The head color is mostly

dark brown, including the occipital, frontal, clypeal, and labral areas, as well as the antennal scape and pedicel; however, it gradually becomes pale yellowish brown on both sides behind the eyes (Figs. 3, 8). The yellowish-brown color continues towards the front, narrowly around the eyes, and then towards the ventral side of the head, which is also pale brown. The genal area is brown, while the pronotum is darker than the head. Both head and pronotum are pilose. Navás (1936) did not specify the sex of the specimen, and provided the following measurements: body length 7 mm, forewing length 10 mm (slightly larger than my measurement), and hind wing length 9 mm. Because of the small size, the specimen is probably a male.

*Description of adult*.—Forewing length, [probably ♂] 9.5 mm. Overall color dark brown, wings slightly paler. Head (Figs. 3, 8) dark brown, particularly occiput, frons, clypeus, and labrum, pilose; head laterally behind eyes gradually becoming paler, also narrowly around eyes; scape and pedicel dark brown; head ventrally pale yellowish brown. Mandible brown, distally yellowish, mostly concealed beneath labrum; maxilla, including 4-segmented palp dark brown; labial palp dark brown, 3-segmented.

Pronotum dark brown, darker than head, pilose. Legs uniformly brown, 5-segmented tarsi darker, tarsal claws brown with basal tooth small, blunt. Forewing (Figs. 4, 10) dull reddish brown, semitranslucent, elongate-elliptical; costal area not enlarged, with 8 crossveins, oblique, those distally less well-defined; three crossveins between  $R_1$  and  $R_s$ , the latter with two branches, both forked; four r-m crossveins.

*Material examined* (Fig. 5).—Holotype [sex unknown]. BRAZIL. São Paulo: Ypiranga, 09.xi.[19]09, Luederwaldt.



Figs. 11–15. *Protosialis ranchograndis*. 11, Male genitalia, caudal, reversible sac is retracted but sclerotized setae visible. 12, Same, lateral. 13, Same, dorsal. 14, Female genitalia, ventral. 15, Same, lateral.

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## LITERATURE CITED

- Banks, N. 1920. New neuropteroid insects. Bulletin of the Museum of Comparative Zoology, Harvard University 64: 299–362.
- Contreras-Ramos, A. 1998. Systematics of the dobsonfly genus *Corydalus* (Megaloptera: Corydalidae). Thomas Say Publications in Entomology, Monograph 16, Entomological Society of America, Lanham, Maryland, 360 pp.
- . 1999. List of species of Neotropical Megaloptera. Proceedings of the Entomological Society of Washington 101: 274–284.
- . 2002. Six new species of dobsonflies from Venezuela (Megaloptera: Corydalidae: Corydalinae). Aquatic Insects 24: 55–75.
- . 2004. Is the family Corydalidae (Neuroptera, Megaloptera) a monophylum? Denisia 13: 135–140.
- Contreras-Ramos, A., G. L. Fiorentin, and Y. Urakami. 2005. A new species of alderfly (Megaloptera: Sialidae) from Rio Grande do Sul, Brazil. Amazoniana 28: 267–272.
- Enderlein, G. 1910. Eine neue *Sialis* aus Columbien. Stettiner Entomologische Zeitung 1910: 380–381.
- Glorioso, M. J. 1981. Systematics of the dobsonfly subfamily Corydalinae (Megaloptera: Corydalidae). Systematic Entomology 6: 253–290.
- Navás, L. 1933. Décadas de insectos nuevos. Brotéria 2: 33–44, 101–110.
- . 1936. Insectos del Brasil (5a. serie). Revista do Museu Paulista 20: 722–734.
- Penny, N. D. 1981. Neuroptera of the Amazon Basin. Part 4, Sialidae. Acta Amazonica 11: 843–846.
- Ross, H. H. 1937. Studies of Nearctic aquatic insects, I. Nearctic alder flies of the genus *Sialis* (Megaloptera, Sialidae). Illinois Natural History Survey Bulletin 21: 57–78.
- Weele, H. W., van der. 1909. New genera and species of Megaloptera Latr. Notes from the Leyden Museum 30: 249–253.
- . 1910. Megaloptera (Latreille), monographic revision, pp. 1–93 + 4 pls. In Collections Zoologiques du Baron Edm. de Selys Longchamps Fasc. V (Première partie), Bruxelles.
- Whiting, M. F. 1994. Cladistic analysis of the alderflies of America north of Mexico (Megaloptera: Sialidae). Systematic Entomology 19: 77–91.